IGCC: Too risky for private investment

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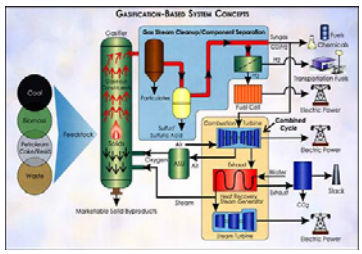
What is IGCC – coal gasification?

It's too complicated to explain in any depth!



www.excelsiorenergy.com/public/index.html - Sect. IV

What's the current state of IGCC?

We were on the verge of reliving the 70's

- 70's were not a good time for power plants
  - Construction outpaced demand – grossly overbuilt
  - High investments in untried technology
    - Plants built incorporating design changes and fixes
    - Couldn't estimate cost because of design problems
    - Demonstration technology needed many false starts
    - Costs escalated many fold
    - Some plants abandoned and ratepayers took hit
- Reviving coal industry was taking precedence over prudent expenditures, environment, public health and public interest – it was nuclear all over again, but it's gone critical, and IGCC is going down

What's the current state of IGCC?

- Denial – promotional efforts are based on false promises of IGCC's superior environmental performance and capture "ready" technology (CSS) that is all talk and no action
- Chaos – many plants are proposed but there's little basis in fact or experience to guide proponents or opponents … until now!
- Flux – when the truth of IGCC comes out, it knocks the flux out of a well-orchestrated promotional scheme
- Vulnerable – all the above makes successful deployment doubtful – the house of cards is coming down

Cost of IGCC?

Cost of Mesaba (shhhh, it's a secret):

- $2,155,680,783 for 600MW
- $3,593/kW

That's about <u>twice</u> the $1.2 billion cited in the MN press in AP articles across state just before public hearings on cost!!!

It's higher than this week's Standard & Poor's estimates.

What does IGCC cost?

From MN Dept. of Commerce analysis (Dr. Amit):

All levelized costs:

	¢/s xmsn emissions	Xmsn $/MWh	Cost ¢/Xmsn	Sequestration $/MWH	TOTAL $/MWh
West 603MW	96.04	9.21	105.25	50.02	155.27
East 598MW	104.91	9.21	114.12	50.02	164.14
West 450MW	120.87	9.21	130.08	50.02	180.10
East 450MW	130.76	9.21	139.97	50.02	189.99
BS II	73.02	2.74	75.76	----	75.76
Sherco4	72.54	2.79	75.33	----	75.33

Secret cost & emissions info

Nationwide effort to keep information from public view and scrutiny

- Minnesota – Required multiple motions to open documents, most now public
- Delaware – Redacted beyond recognition, motions to no avail and info still secret
- Excelsior info needed in other jurisdictions

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How is IGCC financed?

- Demonstration-stage technology
- Not ready for commercial deployment
- Deemed by DOE and Wall Street to be "too risky" for private investment
- Assumed at least 20% more expensive than conventional coal (reality is a LOT higher)

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A financing scheme…

"IGCC is not perceived in the U.S. to have sufficient operating experience to be ready to use in commercial applications."

Harvard set out to find a way around these financial barriers:

- 3 Party Covenant
  - Federal Government
  - State Government
  - Equity investor or IPP with PPA for equity

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A financing scheme…

Purpose of financing scheme is To transfer risk & burdens and lower IGCC's cost of capital:

- Reduce cost of debt
- Raise debt/equity ratio
- Minimize construction financing costs
- Allocate financial risk

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A financing scheme…

- Federal provides grants, tax credits and guaranteed loans
- State provides assured revenue stream (PPA) where state finds need for baseload; regulatory free passes (see, e.g., MN, IN)
- Utility or IPP provides… well…not much… IPP provides only a Power Purchase agreement, and equity ratio is shifted from typical 45% to 20%; in PPA risks are unreasonably shifted off of developer onto ratepayers, utility, taxpayers

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A financing scheme…

IGCC's best chance of success under the Harvard scheme:

- Take existing federal and state perks and always grab for more!
- Distressed gas generation assets
- Tout emissions "benefits" of IGCC
- Sites with existing infrastructure
- Conversion of coal or natural gas plants
- Cogeneration opportunities, i.e., chemical, hydrogen

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Financing scheme crashed

Primary objection to Excelsior's PPA:

It's overpriced power that we don't need

Some other financial issues:

- Transfer of risk to Xcel unacceptable
  - Shareholders would take hit because Xcel would have to carry on balance sheet as debt
  - Ratepayers would take massive hit – too many variables, i.e., no coal contract (~1/3 PPA cost), EPC cost wouldn't be nailed down until after PPA
- Transmission interconnection and network upgrades unidentified, could be very high, and Xcel and Minnesota Power would take hit

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Minnesota & Delaware saying no!

- Minnesota ALJs recommended Excelsior PPA be denied – PUC decision pending
  - Not "Innovative Energy Project" primarily because coal not primary fuel
  - Not a likely least-cost option
  - No great emissions improvement – better on only two of four criteria, that's not sufficient
- Delaware PSC approves wind/gas combo
  - RFP with wind, gas and coal gasification bids
  - Staff recommends wind/gas combo

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Analysis: Is a project vulnerable?

MANY approaches – early is best!

- Is there significant financing from Feds?
- Are there other federal benefits, grants
- Are there state benefits, i.e., regulatory circumvention/exemption, tax breaks, grants
- Are there local benefits, i.e., infrastructure
- Can project be interconnected?

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What projects have $$$ lined up?

IGCC requires that all the stars be aligned – loans, tax credits, state perks

- Many states have IGCC promotional statutes
- Several projects have DOE 48A tax credits

Only Mesaba and Orlando have the DOE federally guaranteed loans pledged – others are doubtful

When Mesaba is denied, funds become available. Which project is next in line?

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CO2 storage is long way off

CSS isn't happening anytime soon

- DOE Addendum to Gilberton, PA CTL's EIS
  - CSS not ready in near term
- Standard & Poor's recent reports
  - CCS very expensive, $40/ton, ~$216m for Mesaba
  - Not likely in near term

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CO2 CSS cost?

Three elements to CO2 CSS:

- Capture, Transport & Sequestration
- Capture
  - 30% fairly easy, to 85-90% difficult & costly
  - Sequestration not considered – cost estimates are to plant gate only – Booz Allen
  - Efficiency loss 25+%, 600MW becomes 450MW
  - Capitol cost increase of 45+% (low swag)
  - O&M increase $2-2.5 million annually
  - Capture alone is so costly that utility modeling picks trade over CSS every time! (Booz Allen)

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CO2 CSS cost?

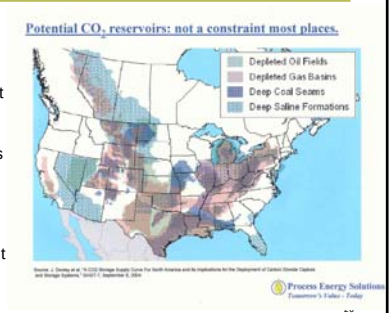
Transport of CO2 requires high volume (Mesaba is 5.4 million tons annually) high psi pipeline and repressurization stations

- Experiments have begun – Weyburn, Texas, all on very small scale
- $60,000 per inch per mile (Steadman)
- $1.4 million for pipeline from Taconite to western North Dakota
- Capital cost of repressurization stations?
- Parasitic load = 4-10MW each

CO2 CSS Cost?

Where to sequester?

- Deep saline best
- Inverse correlation between enviros "Midwest" IGCC target and CSS potential!
- 600 miles from Taconite to West North Dakota



CO2 CSS Cost?

Sequestration – identify, characterize and obtain site; pump in, monitor forever

- DOE Addendum to Gilberton, PA coal-to-liquids plant shows it's not feasible and CO2 volume far exceeds potential available storage
- Cost estimates range from $3-10/ton to $260. Standard & Poor's has recent estimate of $40/ton
- Hydrological issues – like plunger in toilet
- Seismic issues – millions of tons of CO2 shifting earth
- Migration issues – see "Gas Migration," the tome of underground storage

Environmental costs

Excelsior's comparative emissions, Table RSE-1:

Emission	ICF Modeled Rate for Mesaba (lb/hr)	Mesaba Project PSD Permit Application (lb/hr)	ICF SCPC Plant (lb/hr)	CFB South Heart (lb/hr)
Sulfur Dioxide, SO2	123	158	431	259
Nitrogen Oxide, NOx	339	321	377	598
Carbon Monoxide, CO	274	257	809	996
Particulate matter, MP10	48	51	108	153
Volatile organics, VOC	16	17	22	17
CO2 (not modeled, but provided for information	N/A	616 tons/hour	618 tons/hour	720 tons/hou[illegible]2

Environmental costs

	NOx		SO2		PM		Hg		CO2	
	lb/MWh	lb/MMBtu	lb/MWh	lb/MMBtu	lb/MWh	lb/MMBtu	lb/MWh	lb/mmBtu	lb/MWh	lb/mmBtu
Mesaba IGCC subbituminous (a)	0.535	0.057	0.34	0.03	0.085	0.009	4.70E-06	5.00E-07	2035	213.94
EPA "generic" subbituminous IGCC (f)	0.326	0.044	0.09	0.01	0.052	0.007	3.58E-06	4.20E-07	1818	213.34
Wabash (Illinois coal) (actual) (b)	1.337	0.150	0.89	0.10	0.107	0.012			203.74	203.74
EPA "Generic" subbituminous ultra-supercritical (f)	0.450	0.060	0.75	0.10	0.090	0.012	3.42E-06	4.20E-07	1738	213.34
existing subcritical pulverized coal with BACT controls (c)	0.730	0.070	0.94	0.09	0.146	0.014	5.21E-06	5.00E-07	2211	212.14
Sithe Global Energy Desert Rock Supercritical PC (d)	0.597	0.060	0.60	0.06	0.100	0.01	1.89E-05	1.90E-06	1884	199.29
SWEPCO Hempstead Co. Ultra SuperCritical PC subbituminous (e)	0.665	0.070	0.95	0.10	0.143	0.015	3.99E-06	4.20E-07	2015	212.14
EPA "generic" subbituminous supercritical (f)	0.500	0.060	0.54	0.07	0.100	0.012	3.78E-06	4.20E-07	1920	213.34

	Net Thermal Efficiency % HHV	Net Heat Rate Btu/kWH	Gross Power MW	Internal power MW	Heat input mmbtu/hr	fuel required lb/hr	Net Power MW
Mesaba IGCC subbituminous (a)	36.3%	9,397	740	143	5616		598
EPA "generic" subbituminous IGCC (f)	40.0%	8,520	575	75		484,089	500
Wabash (Illinois coal) (actual) (b)	39.7%	8,910					192
EPA "Generic" subbituminous ultra-supercritical (f)	41.9%	8,146	543	43		460,227	500
existing subcritical pulverized coal with BACT controls (c)	32.7%	10,423			3355		350
Sithe Global Energy Desert Rock Supercritical PC (d)	34.3%	9,954	1500		6800	800,000	2 @ 683 net
SWEPCO Hempstead Co. Ultra SuperCritical PC subbituminous(e)	35.9%	9,500			6000 (b)	750,006	600
EPA "generic" subbituminous supercritical (f)	37.9%	9,000	541	41		517,045	500

(a) Mesaba Energy I air emissions permit application, June 2006, p. 48. Excelsior Energy December 2005 Filing, Section IV, p. 51. Also, Robert Evans Rebuttal Testimony, October 10, 2006 p. 18.
(b) Wabash performance from www.clean-energy.us/projects/wabash_indiana.htm accessed on October 10, 2006
(c) Minnesota Power Boswell 3 retrofit, August 2006 permit application
(d) Desert Rock efficiency, heat rate calculated from PSD permit application accessed 10/9/06 at www.epa.gov/region9/air/permit/desertrock/index.html

(e). SWEPCO permit application indicates the boiler to be a supercritical boiler with a heat input rate of 6000 mmbtu/hr; AEP contact indicates the plant is being designed as an ultra supercritical plant, and design heat input rate is 5700 to 5800 mmbtu/hr; net electrical output 600 MW. This difference affects the net heat rate calculation and total boiler efficiency.
(f) EPA generic expected plant performance characteristics EPA-430R-06-006 July 2006

Given the costs, WHY?

- Minnesota and Delaware are moving towards rejection of IGCC
- This is what we have learned from the first two projects in the regulatory process
- Review the records from Minnesota and Delaware and see for yourself!

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